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Cultural Variation in Vigilance and Precaution Themes

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14. ABSTRACT <i>Frequency distribution of threat appraisal ratings</i> - A general comparison between the two populations, SA and UK, regarding their distribution of rankings was done. We found that while in the UK population the percentage of high rankings (5, 6, and 7) was not significantly different from the percentage of low rankings (1, 2, and 3), in the SA population the percentages were significantly different. In the SA population, subjects had a higher tendency to evaluate potential threats as more worrying rather than less worrying. <i>Cultural differences in threat appraisal</i> - In order to determine the saliency of each potential threat domain in each of the populations, a Repeated Measures ANOVA test was performed separately on the data of each population. For the UK population, we found a significant difference in the appraisal of different potential threat domains. The appraisal of Contamination/Contagion (CC) domain was significantly higher than the appraisal of the other three potential threat domains: PA, SS, and DR. For the SA population, we found that there is a significant difference in the appraisal of different potential threat domains. The appraisal of Social Status (SS) domain was significantly lower than the appraisal of the other three potential threat domains: CC, PA, and DR. A comparison between the two populations, UK and SA, was performed and revealed a significant difference in the appraisal of potential threat domains. More specifically, in the SA population there was a significantly higher appraisal than in the UK population in two of the four potential threat domains: Predation/Assault and Decline in Resources. <i>Gender differences in PA domain</i> - The results of gender-group analysis showed a similar pattern in both populations. In the UK there was found a significant difference between genders in the appraisal of PA potential threats. Moreover, Predation/Assault (PA) was the only potential threat domain that was evaluated significantly different by female and male, as the average appraisal given by female participants was significantly higher than the average appraisal given by male. Similarly, In SA population there was found a significant difference between genders in the appraisal of the Predation/Assault (PA) domain. As in the UK population, the average appraisal given by female participants was significantly higher than the average appraisal given by male in the PA domain. <i>Ethnic differences in threat appraisal ratings in SA</i> - The SA sample of participants was divided into two groups based on ethical background: White and Non-White. The Non-White sample is varied and includes Zulu, Sotho, Xhosa, Indians and others. There was found a significant difference between different ethnic groups in SA in the appraisal of potential threat domains. The average appraisal given by the Non-White participants was significantly higher than the average appraisal given by White participants in all four potential threat domains.						
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Cultural Variation in Vigilance and Precaution Themes

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Project summary

This study was intended to contribute to a better understanding of cross-cultural preoccupations with potential danger domains, specifically what variability there is within and between distinct cultural populations and if there are developmental aspects to potential danger theme preoccupations. Such understanding will then be used to support other conceptually and practically integrated projects within the greater Vigilance and Precaution Project which will further an understanding of human precautionary systems in general.

In particular this study attempted to gain a better understanding of precautionary behavior within and between distinct populations with varying content of cultural forms (e.g. religious traditions, cultural rituals) by determining whether there are culturally specific precautionary preoccupations, determining how these preoccupations are acquired, learned, and calibrated, and identifying key developmental aspects of culturally specific precautionary preoccupations. The scientific object is the relative salience of potential danger domains of normal adult (16+ y/o) participant groups from South Africa and Northern Ireland. Adults will be orally presented with narrative comprehension questions and survey scales.

Introduction

- In this project we considered how specific neuro-cognitive systems handle human reactions to potential threats. Research so far tells us that human brains comprise a set of **Threat-Detection Systems** dedicated to
 - identifying particular cues of potential danger,
 - suggesting appropriate precautions
 - after precautions are taken, providing people with a sense of safety.
- The purpose of this study was to use no-risk, non-invasive survey questionnaires in interviews to understand judgments about relative salience of precautionary domains by normal adult participant groups from South Africa and Northern Ireland. Four different instrument scales were used

Methods, Assumptions and Procedures

Assumptions

- It is important to distinguish between Imminent Danger (manifest threats) and Potential Danger (inferred threats). That is between ‘fear psychology’ and ‘precautionary psychology.’
- Precautionary Psychology evolved by means of natural selection to deal with Potential Danger.
- Boyer/Liénard and Szechtman/Woody/Eilam models are reasonable frameworks within which to pursue the following inquiry because they clearly lay out the cognitive and neuro-biological structure of a proposed precautionary psychology, provide a plausible account of its mode of operation in dealing with situations of potential danger, and suggest reasonable empirical and experimental programs for confirming their claims.
- A crucial part of the Boyer/Liénard Hazard-Precaution model is their definition of ritualized behavior: a set of behaviors characterized by goal-demotion, scriptedness/rigidity, redundancy/repetition, and compulsion. It is important to note the following:
 - The behaviors considered must reflect all of these characteristics and not those that we find singly (i.e. in isolation).
 - Ritualization is the opposite of routinization. As Boyer and Liénard point out, this claim runs counter to much of the representations of “ritual” in the anthropological literature. Ritualization is a process of constructing behaviors that require a high degree of cognitive control, which precludes automaticity. Routinization is a process of automatizing behaviors, requiring low cognitive control.

Problems

- To what extent, if any, are ritualized acts elements in cultural or collective rituals in general and religious rituals in particular?

- If ritualized acts are elements of cultural rituals to what extent, if any, are they continuous with individual (1) pathological behaviors (such as those exhibited by OCD patients) and (2) non-pathological precautionary measures (such as those exhibited by normal adults)?
- To what extent, if any, are the ritualized elements within cultural rituals – via their possible relationship to pathological and non-pathological precautionary measures - examples of adaptive strategies or by-products of such strategies? (Such strategies are to be understood as behavioral outputs of mechanisms [1] the purpose of which are precautionary, i.e. responses to potential danger and [2] are selected for by evolutionary forces).
- To what extent, if at all, are precautionary behavioral strategies variable within and between particular populations?
- Do non-pathological individual and collective precautionary behaviors reflect the same preoccupation with one particular precautionary domain over others as expressed in clinical populations (e.g. OCD patients) – despite the universal salience of all potential danger domains?
- At what point, if any, are precautionary systems fixed in terms of domain sensitivity? That is, is there a point at which a particular preoccupation becomes more salient? Is this state then fixed or are there merely learnability constraints?
- Are there discernible developmental calibration stages of precautionary psychology in general? Do capabilities to be sensitive to the different potential danger domains emerge at different stages of development (before any dominant preoccupation emerges)?
- To what extent is the emergence of other cognitive capacities implicated in the development/calibration of precautionary psychology? For example, does Theory of Mind development play a role in sensitivity to inferred predation or social status threats; does the emergence of a disgust mechanism coincide with the emergence of a sensitivity to inferred contamination/contagion threats?
- In multiple trial cultural ritual situations, to what extent is the accuracy of low-level parsed actions attended to by the ritual participants?

Hypotheses

- There is a component of the structure (e.g. action sequence) of collective ritual actions that is an indicator of precautionary behavior. This may simply be that the prescribed actions have those characteristics necessary to promote/require low-level action parsing which swamps working memory.
- Precautionary concerns (spanning all potential danger domains) are expressed in both collective rituals and individual precautionary measures (pathological and non-pathological).
- The particular content of the precautionary aspects of collective rituals AND individual precautionary behaviors varies across cultures.
- Dominant precautionary preoccupations (culled from the limited potential danger domain set, or Potential Hazard Repertoire) will vary across cultures.

- The content of precautionary preoccupations in collective rituals correspond with individual anxiogenic thoughts (both pathological and non-pathological) within the same culture/population.
- Collective rituals and individual precautionary measures (pathological and non-pathological) within the same culture/population have corresponding dominant potential danger domain preoccupation(s).

Methods

1. Likert scale

- [Strongly disagree] to [Strongly agree]
- Example – “I worry about walking alone, at night, in the dark.”

2. Thurstone scale

- [Agree? Y or N]
- Example – “Contamination by a [toxic substance] is worse than [predator] attack.”

3. Ranking scale

- [Rank these items from most to least worrying]
- Examples
 - [Predator] footprint
 - [Foul smelling substance] spilled on ground
 - Walking in the dark alone

4. Vignette instrument

- Read vignette, answer series of questions after
- Example vignette:

A man was wading in a [river, sea] trying to catch fish for his employer. This river is the best place to catch a lot of fish. A [crocodile, shark] suddenly appeared and attacked him, biting him several times. He was found, nearly dead, by his friends and taken home. His employer was very angry that he had failed to catch any fish and lowered his pay. He said that he would lose his job if the man did not catch more fish next time.

5. Example questions:

- How likely is it that he will go back?
- How likely is it that he will be attacked if he does go back?
- How likely is it that he will not go back?
- How likely is it that he will lose his job if he doesn't go back?
- Would you go back if it were you?

Conclusions and Discussion

Frequency distribution of threat appraisal ratings

A general comparison between the two populations, SA and UK, regarding their distribution of rankings was done. We found that while in the UK population the percentage of high rankings (5, 6, and 7) was not significantly different from the percentage of low rankings (1, 2, and 3), in the SA population the percentages were significantly different. In the SA population, subjects had a higher tendency to evaluate potential threats as more worrying rather than less worrying.

Cultural differences in threat appraisal

In order to determine the saliency of each potential threat domain in each of the populations, a Repeated Measures ANOVA test was performed separately on the data of each population. For the UK population, we found a significant difference in the appraisal of different potential threat domains. The appraisal of Contamination/Contagion (CC) domain was significantly higher than the appraisal of the other three potential threat domains: PA, SS, and DR.

For the SA population, we found that there is a significant difference in the appraisal of different potential threat domains. The appraisal of Social Status (SS) domain was significantly lower than the appraisal of the other three potential threat domains: CC, PA, and DR.

A comparison between the two populations, UK and SA, was performed and revealed a significant difference in the appraisal of potential threat domains. More specifically, in the SA population there was a significantly higher appraisal than in the UK population in two of the four potential threat domains: Predation/Assault and Decline in Resources.

Gender differences in PA domain

The results of gender-group analysis showed a similar pattern in both populations. In the UK there was found a significant difference between genders in the appraisal of PA potential threats. Moreover, Predation/Assault (PA) was the only potential threat domain that was evaluated significantly different by female and male, as the average appraisal given by female participants was significantly higher than the average appraisal given by male. Similarly, In SA population there was found a significant difference between genders in the appraisal of the Predation/Assault (PA) domain. As in the UK population, the average appraisal given by female participants was significantly higher than the average appraisal given by male in the PA domain.

Ethnic differences in threat appraisal ratings in SA

The SA sample of participants was divided into two groups based on ethnical background: White and Non-White. The Non-White sample is varied and includes Zulu, Sotho, Xhosa, Indians and others. There was found a significant difference between different ethnic groups in SA in the appraisal of potential threat domains. The average appraisal given by the Non-White participants was significantly higher than the average appraisal given by White participants in all four potential threat domains.

Example Results

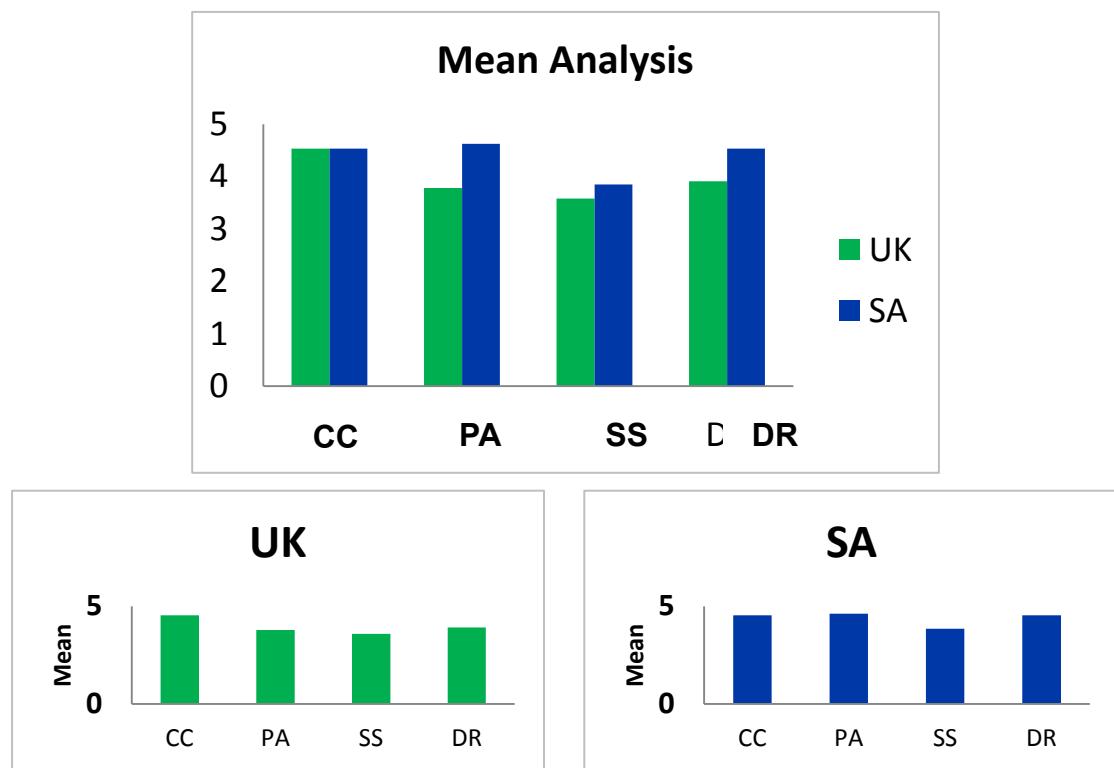


Figure 1 – Overall mean analysis differences between SA and UK populations

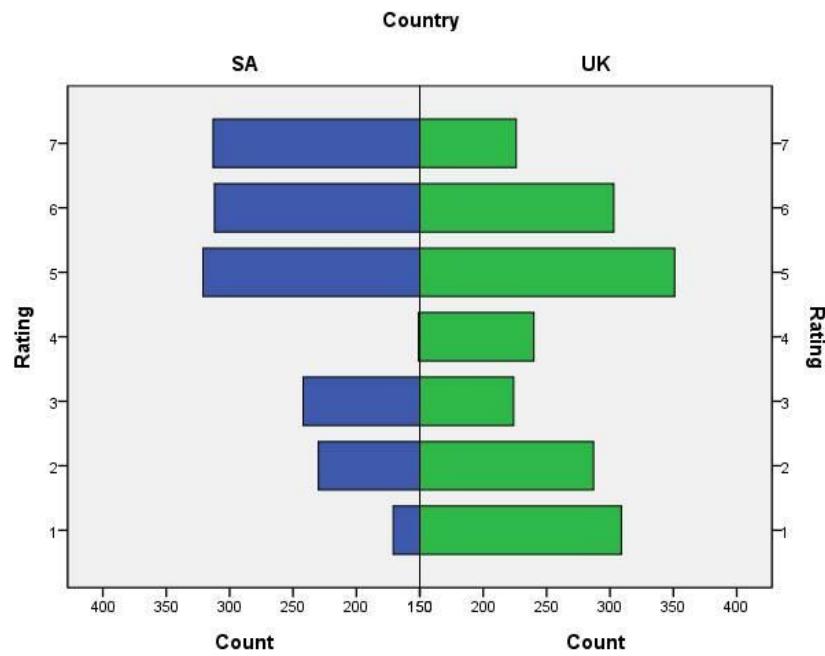


Figure 2 – Rating count differences between SA and UK populations

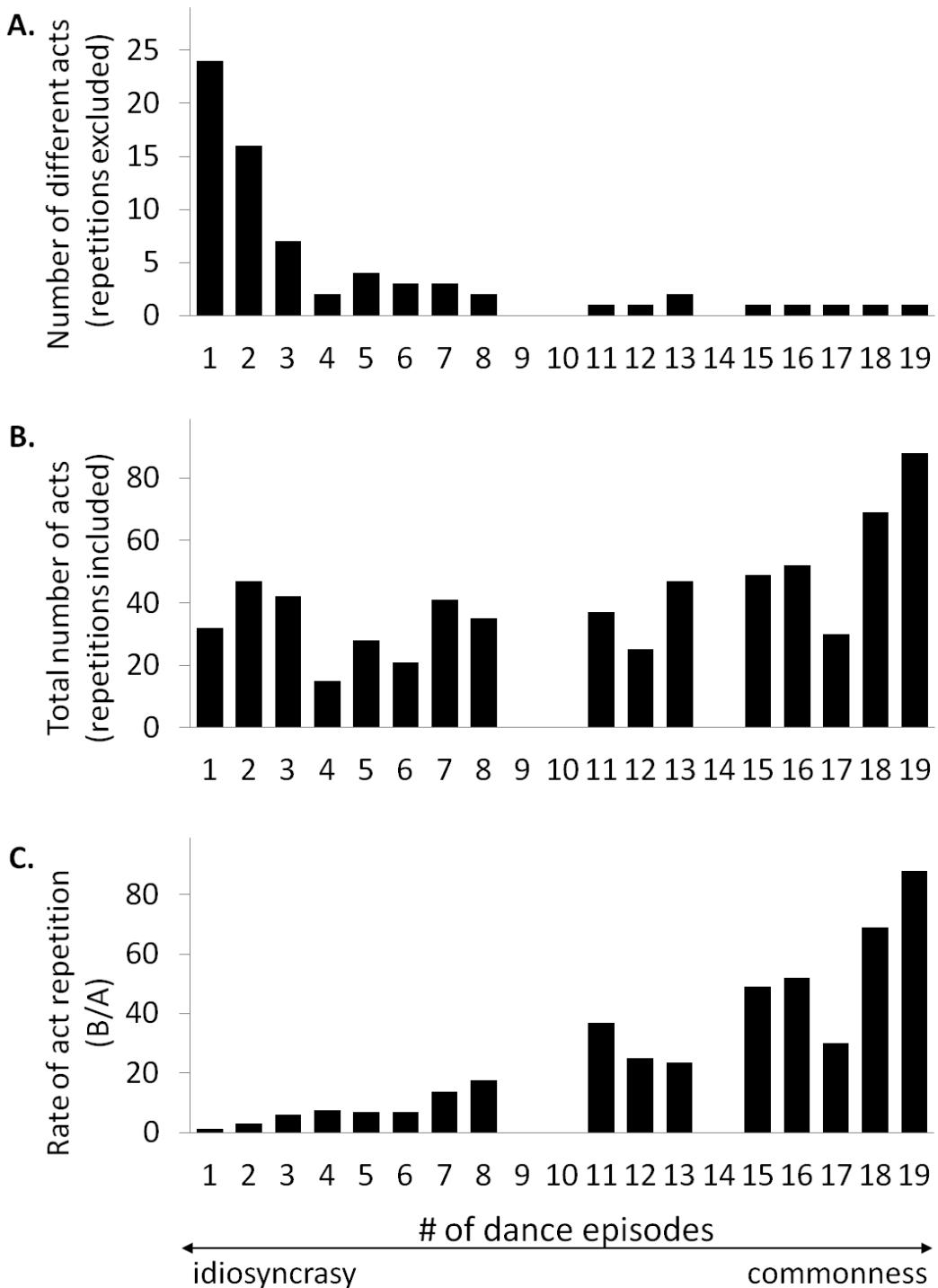


Figure 3

A. The repertoire of common and idiosyncratic acts (repetitions excluded) and the incidence of these act types is depicted here with the most idiosyncratic acts that were performed in only one episode depicted on the left-most bar, and the most common act that was performed in all 19 episodes depicted on the right-most bar. Specifically, there were 24 acts that were performed only in 1 episode, 16 acts that were performed in 2 episodes, 7 acts that were performed in 3 episodes, and so on. As shown, there was only

one act performed in all 19 episodes. The x-axis thus represents the commonness of an act; the more common was the act, the more it was located to the right and the less common the act, the more it was located to the left. Overall, the number of acts decreased with their commonness; in other words, there were more types of idiosyncratic acts than types of common acts.

B. The total number of acts (repetition included) according to their commonness. The 24 acts that were performed only in one episode (leftmost bar) added up to 32 when repetitions were included (leftmost open bar). Similarly, the 16 acts that were performed in 2 episodes added up with repetitions to 47 acts (2nd leftmost bar), and so on.

C. The rate of act repetition (the total number of acts divided by the number of different acts; or in other words, B divided by A for each column). As shown, the more common an act, the more it was repeated, culminating in the single common act that was performed 88 times in all 19 episodes (right-most bar), and with repetitions added up to 88 performances. Conversely, the 24 most idiosyncratic acts were hardly repeated (left-most bar).

Altogether, the more common acts that appeared in most or all dance episodes were repeated more than the idiosyncratic acts that appeared in only few dance episodes.

Comments

At the writing of this report not all the data analysis has been completed. Analysis of surveys B, C, and D have not been done nor all analysis of survey A. Furthermore the complicity of cultural rituals has been addressed by data collection in South Africa and our PhD student was in the process of analyzing the economic game theory protocol data collected there when the grant period expired. Further work will be done (outside of the grant) on the Zulu ritual data as well as the data from the 4 experimental protocols.

Spending shortfall: Due to a QUB administrative freeze on spending grant funds for the majority of the final grant period, approximately \$30,004 remains frozen and unavailable to the PI at the date of the expiry of the grant.

Publications supported by this grant include:

Keren, H., Fux, M., Lawson, E. T., Mort, J., and Eilam, D. (under review). Are Collective Motor Rituals as Rigid as They Seem? The Test Case of A Zulu Wedding Dance. *Journal of Cognition and Culture*. Leiden: Brill.

Mort, J., Fux, M., and Lawson, E. T. (in prep). Dominance and Subordination of Precaution Themes.

Fux, M., Lawson, E. T., Mort, J. (in prep). Comparison of potential threat preoccupations in United Kingdom and South Africa populations.

References

Boyer, P., & Liénard, P. (2006). Why ritualized behavior? Precaution systems and action parsing in developmental, pathological and cultural rituals. *Behavioral and Brain Sciences*, 29(6), 595-.

Buck, R. (1988). Human motivation and emotion. Oxford: John Wiley and Sons.

Eilam, D. and Mort, J (in press). Commentary on: Cognitive Resource Depletion in Religious Interactions (Schoedjt et al.) *Religion, Brain, and Behavior*.

Eilam, D., Izhar, R., and Mort, J. (under review). Threat detection: Behavioral consequences in animals and humans. *Neuroscience and Biobehavioral Reviews*.

Eilam, D., Zadicario, P., Genossar, T., and Mort, J. (2012). The anxious vole: the impact of group and gender on collective behavior under life-threat. *Behavioral Ecology and Sociobiology*. 66(1).

Eilam, D., Zor, R., Szechtman, H., & Hermesh, H. (2006). Rituals, stereotypy and compulsive behavior in animals and humans. *Neuroscience and Biobehavioral Reviews*, 30(4), 456-471.

Ekman, P., & Friesen, W. V. (1969). The repertoire of nonverbal behavior: Categories, origins, usage, and coding. *Semiotica*, 1, 49–98.

Faulkner, J., Schaller, M., Park, J., and Duncan, L. (2004). Evolved Disease-Avoidance Mechanisms and Contemporary Xenophobic Attitudes. *Group Processes & Intergroup Relations*, 7(4): 333–353.

Keren, H., Boyer, P., Mort, J., and Eilam, D. (under review) Precautionary behavior in animals, humans, cultural rituals, and pathology.

Koenigs, M., E. D. Huey, et al. (2008). "Focal brain damage protects against post-traumatic stress disorder in combat veterans." *Nature Neuroscience* 11(2): 232-237.

LeDoux, J. E. (1998). The emotional brain: the mysterious underpinnings of emotional life. New York: Simon & Schuster.

LeDoux, J. E. (2002). The synaptic self: how our brains become who we are. New York: Viking Press.

Sadique, M. Z., Edmunds, W. J., Smith, R. D., Meerding, W. J., de Zwart, O., Brug, J., et al. (2007). Precautionary behavior in response to perceived threat of pandemic influenza. *Emerging Infectious Diseases*, 13(9), 1307-1313.

Seligman, M. E. (1971). Phobias and Preparedness. *Behavior Therapy*, 2(3), 307-320.

Szechtman, H., & Woody, E. (2004). Obsessive-compulsive disorder as a disturbance of security motivation. *Psychological Review*, 111(1), 111-127.

Szechtman, H., Eckert, M., Tse, W., Boersma, J., Bonura, C., McClelland, J., et al. (2001). Compulsive checking behavior of quinpirole-sensitized rats as an animal model of Obsessive-Compulsive Disorder(OCD): form and control. *BMC Neuroscience*, 2(1), 4.

Tooby, J., & Cosmides, L. (1990). The past explains the present - emotional adaptations and the structure of ancestral environments. *Ethology and Sociobiology*, 11(4-5), 375-424.